# Progress and Challenges in Phytotherapy Research of *Rhodiola rosea* L: A Phytomedicinal Overview Update

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Recently, the Herbal Medicinal Products Platform Austria (HMPPA) committee chose RHODIOLA ROSEA as a medicinal plant in 2023 in Austria. What achievements are behind this choice of HMPPA? This phytomedicinal overview provides the summary of recent scientific evidence of the efficacy of *Rhodiola rosea* L in stress-induced and aging-related disorders (mild/moderate depression, anxiety, burnout symptoms, fatigue syndrome, cognitive deficiencies, sensitive skin, in healthy subjects in stress) in 33 clinical and 910 pre-clinical studies conducted in Europe, America, and China in 2000-2023. Seventeen clinical studies were conducted on the fixed combinations of Rhodiola rosea with Green Tea, Cordyceps, Gingko, Caffeine (in healthy subjects under stress), Schisandra, and Eleutherococcus (in patients with symptoms of acute pneumonia or Long COVID), Black Cohosh (in menopausal symptoms), Saffron (in mild depression), Glycyrrhiza glabra and Eleutherococcus (in chronic parodontids). These studies were assessed in 35 systematic and 84 descriptive reviews, Figure.

The molecular mechanisms of adaptogenic activity of Rhodiola (and purified compounds) in stress-induced and aging-related disorders were studied. The reductionist concept, which is based on a *single target-based effect of* ligand-receptor interaction, is not a suitable model for Rhodiola and other adaptogens affecting multiple physiological functions and revealing polyvalent pharmacological activities in many conditions. Recent studies provided a rationale for the pleiotropic therapeutic efficacy of Rhodiola based on evidence from recent gene expression studies in target cells and network pharmacology/systems biology approaches. The specific molecular targets of Rhodiola were identified in isolated brain cells where the changes of expression of genes involved in various molecular and cellular functions and physiological systems functions are associated with neurological diseases, behavioral and psychological disorders, endocrine, metabolic, cardiovascular, and gastrointestinal disorders.

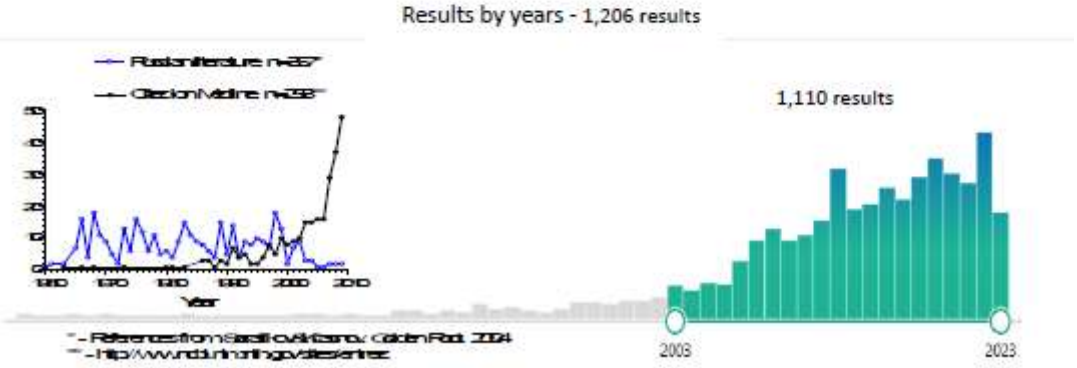


Figure 1. Publications count in the USSR and worldwide from 1960 to 2023.